

Claims

1. A gas generant composition comprising a fuel, an oxidizing agent and an additive, wherein the fuel comprises at least one high-energy nitrogen-containing organic compound and at least one low-energy nitrogen-containing organic compound, and the low-energy nitrogen-containing organic compound has a 50% average particle diameter of 40 μm or less.
2. The gas generant composition according to Claim 1, wherein the low-energy nitrogen-containing organic compound has the 50% average particle diameter of 20 μm or less.
3. The gas generant composition according to Claim 1, wherein the high-energy nitrogen-containing organic compound comprises at least one material selected from the group consisting of aminotetrazole, nitroguanidine, and triaminoguanidine nitrate
4. The gas generant composition according to Claim 1, wherein the low-energy nitrogen-containing organic compound is guanidine nitrate.
5. The gas generant composition according to Claim 1, wherein the high-energy nitrogen-containing organic compound comprises at least one material selected from the group consisting of aminotetrazole, nitroguanidine, and triaminoguanidine nitrate, and the low-energy nitrogen-containing organic compound is guanidine nitrate.
6. The gas generant composition according to Claim 1, wherein the oxidizing agent comprises at least one material selected from the group

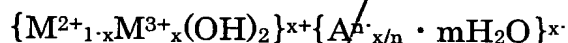
consisting of nitrate, perchlorate, chlorate as concerns alkali metals or alkali earth metals and basic copper nitrate.

7. The gas generant composition according to Claim 1, wherein the oxidizing agent comprises at least one material selected from the group

5 consisting of mixtures of phase stabilized ammonium nitrate or ammonium perchlorate and nitrate, perchlorate, chlorate as concerns alkali metals or alkali earth metals and basic copper nitrate.

8. The gas generant composition according to Claim 1, wherein the additive comprises silicon nitride or silicon carbide.

10 9. The gas generant composition according to Claim 1, wherein the additive comprises hydrotalcites expressed by the following general formula:



where M^{2+} represents bivalent metals including Mg^{2+} , Mn^{2+} , Fe^{2+} , Co^{2+} , Ni^{2+} , Cu^{2+} and Zn^{2+} ;

15 M^{3+} represents trivalent metals including Al^{3+} , Fe^{3+} , Cr^{3+} , Co^{3+} and In^{3+} ;

A^{n-} represents n-valence anions including OH^- , F^- , Cl^- , NO_3^- , CO_3^{2-} , SO_4^{2-} , $Fe(CN)_6^{3-}$, CH_3COO^- , ion oxalate, and ion salicylate; and

X: $0 < x \leq 0.33$.

20 10. The gas generant composition according to Claim 9, wherein the hydrotalcites comprise synthetic hydrotalcite expressed by the chemical formula of $Mg_6Al_2(OH)_{16}CO_3 \cdot 4H_2O$ or pyroaurite expressed by the chemical formula of $Mg_6Fe_2(OH)_{16}CO_3 \cdot 4H_2O$.

11. The gas generant composition according to Claim 1, wherein the

additive comprises at least one cellulosic binders selected from the group consisting of carboxymethyl cellulose, methyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, and hydroxylpropyl methyl cellulose or natural polymer.

5 12. The gas generant composition according to Claim 1, wherein the additive comprises at least one material selected from the group consisting of polyacrylic acid, sodium polyacrylate, polyacrylamide, and two or three copolymerized compounds thereof.

10 13. The gas generant composition according to Claim 1, wherein the additive is a silane compound.

14. The gas generant composition according to Claim 1, wherein the fuel consists of 5-aminotetrazole and guanidine nitrate, the oxidizing agent consists of strontium nitrate, and the additive consists of silicon nitride and synthetic hydrotalcite.

15 15. The gas generant composition according to Claim 1, wherein the fuel consists of 5-aminotetrazole and guanidine nitrate, the oxidizing agent consists of strontium nitrate and potassium nitrate, and the additive consists of silicon nitride and synthetic hydrotalcite.

20 16. The gas generant composition according to Claim 1, wherein the fuel consists of 5-aminotetrazole and guanidine nitrate, the oxidizing agent consists of strontium nitrate and basic copper nitrate, and the additive consists of silicon nitride and synthetic hydrotalcite.

17. The gas generant composition according to Claim 1, wherein the fuel consists of nitroguanidine and guanidine nitrate, the oxidizing agent

consists of strontium nitrate, and the additive consists of silicon nitride.

18. The gas generant composition according to Claim 1, wherein the fuel consists of nitroguanidine and guanidine nitrate, the oxidizing agent consists of strontium nitrate and potassium nitrate, and the additive
5 consists of silicon nitride.

19. The gas generant composition according to Claim 1, wherein the fuel consists of nitroguanidine and guanidine nitrate and the oxidizing agent consists of strontium nitrate and basic copper nitrate.

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10 20. The gas generant composition according to Claim 1, wherein the fuel consists of 5-aminotetrazole and guanidine nitrate, the oxidizing agent consists of strontium nitrate and ammonium perchlorate, and the additive consists of polyacrylamide and silane compound.

15 21. The gas generant composition according to Claim 1, which comprises 10-30 weight% of 5-aminotetrazole as the high-energy nitrogen-containing organic compound, 5-30 weight% of guanidine nitrate as the low-energy nitrogen-containing organic compound, 30-70 weight% of strontium nitrate as the oxidizing agent, and 0.5-10 weight% of silicon nitride and 2-10 weight% of synthetic hydrotalcite as the additive.

20 22. The gas generant composition according to Claim 1, which comprises 20-55 weight% of nitroguanidine as the high-energy nitrogen-containing organic compound, 5-30 weight% of guanidine nitrate as the low-energy nitrogen-containing organic compound, 30-60 weight% of strontium nitrate as the oxidizing agent, and 0.5-10 weight% of silicon nitride and 2-10 weight% of synthetic hydrotalcite as the additive.

23. The gas generant composition according to Claim 1, which comprises 20-55 weight% of nitroguanidine as the high-energy nitrogen-containing organic compound, 5-30 weight% of guanidine nitrate as the low-energy nitrogen-containing organic compound, 30-60 weight% of strontium nitrate as the oxidizing agent, and 0.5-10 weight% of silicon nitride and 2-10 weight% of cellulosic binder as the additive.

24. The gas generant composition according to Claim 1, which comprises 10-30 weight% of 5-aminotetrazole as the high-energy nitrogen-containing organic compound, 5-30 weight% of guanidine nitrate as the low-energy nitrogen-containing organic compound, 10-50 weight% of strontium nitrate and 10-50 weight% of ammonium perchlorate as the oxidizing agent, and 0.5-10 weight% of polyacrylamide and 0.5-10 weight% of silane compound as the additive.

25. The gas generant composition according to any one of Claims 21 through 24, which further comprises not more than 10 weight% of potassium nitrate.

26. The gas generant composition according to any one of Claims 21 through 24, which further comprises not more than 30 weight% of basic copper nitrate.

27. The gas generant composition according to Claim 23, wherein the cellulosic binder comprises at least one material selected from the group consisting of carboxymethyl cellulose, methyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, and hydroxylpropyl methyl cellulose.